Building a Conservation Culture

Report of the Conservation Action Team to the Honourable Dwight Duncan, Minister of Energy

May 19, 2005

May 19, 2005

The Honourable Dwight Duncan, MPP
Minister of Energy

Dear Minister:

Upon establishment of the Conservation Action Team in January 2004, we were directed to seek out and promote the best in conservation ideas and practices.

We present this report summarizing: the outreach and consultation undertaken during the past year; the stakeholder views received; the issues, barriers and opportunities we identified; and, our recommendations to promote a conservation culture in this province.

The Conservation Action Team recommends 30 specific actions to address issues raised by stakeholders with whom we consulted. They are endorsed by all members of the Team and represent our consensus on the initiatives that will help build a conservation culture in Ontario. We believe that our recommendations also support the resolutions approved at the Ontario Liberal Party Conference in November 2004, and we have included those resolutions in our report.

I would like to thank my colleagues, the Parliamentary Assistants, who generously contributed their time to the work of the Team and for their advice in compiling this report. On behalf of them, I also wish to thank the many stakeholders who informed our work. We appreciate the time and effort they provided.

Sincerely,

Donna Cansfield, MPP
Chair, Conservation Action Team and Parliamentary Assistant to the Minister of Energy

Wayne Arthurs, MPP Vice-Chair
Parliamentary Assistant to the Chair of Management Board

Mike Brown, MPP
Parliamentary Assistant to the Minister of Natural Resources

Brad Duguid, MPP
Parliamentary Assistant to the Minister of Municipal Affairs and Housing

Jeff Leal, MPP
Parliamentary Assistant to the Minister of Training, Colleges and Universities

Bill Mauro, MPP
Parliamentary Assistant to the Minister of Northern Development and Mines

Carol Mitchell, MPP
Parliamentary Assistant to the Minister of Agriculture and Food

David Orazietti, MPP
Parliamentary Assistant to the Minister of Education

Richard Patten, MPP
Parliamentary Assistant to the Minister of Economic Development and Trade

Lou Rinaldi, MPP
Parliamentary Assistant to the Minister of Public Infrastructure Renewal

John Wilkinson, MPP
Parliamentary Assistant to the Minister of the Environment

Kathleen Wynne, MPP
Parliamentary Assistant to the Minister of Education

Contents

Executive Summary

Introduction

Government Policy Context

Consultations

Short-Term Actions Undertaken

Recommendations

Appendices

Appendix A - List of Stakeholders Consulted
Appendix B - Best Practices and Demonstration Sites
Appendix C - Acknowledgments
Appendix D - The Framework for Ontario's Conservation Culture

---

Executive Summary

The Conservation Action Team was established in January 2004 with a mandate to seek out the best conservation ideas and practices, and promote conservation through outreach to energy sector stakeholders and the citizens of Ontario. Broadly speaking, the Team was to act as the government's champion for conservation. Its role was to assist in the creation of a conservation culture in the province.

The Team consulted widely, meeting with over 300 groups and individuals who represented virtually all sectors, leading-edge technologies and a wide range of interests in energy. The Team conducted its work within a rapidly evolving policy context, as the government moved to put the electricity sector back on firm footing and introduced new measures, including: targets for reducing demand and increasing renewable supply, a new rate structure, smart meters, and legislation to create an institutional infrastructure for conservation.

The Team received extensive advice from stakeholders. We learned that there is a need for government to provide leadership in conservation by setting broad direction and strategy. Ontario's private and voluntary sectors have expertise and can partner with government to deliver conservation. Stakeholders advised us of many barriers to energy efficiency and renewable energy - regulatory, financial, informational, institutional, policy and others - that need to be addressed. We also heard about new technologies, opportunities and models to instill conservation that could be adopted and built upon.

The government has taken immediate action on several of the barriers and opportunities that were raised with the Conservation Action Team. These are described in our report.

Our report concludes with a set of 30 recommendations to respond to the issues we identified. Our recommendations address: the future role of the Team and the newly created Conservation Bureau in building a culture of conservation; actions required for government to put its own house in order; ways to lever conservation into provincially-funded infrastructure projects and capitalize on horizontal policy activity across government; the reform of codes and standards for which the government has authority; and, suggestions for outreach to vulnerable energy consumers and other targeted groups.

Introduction

Mandate

The Conservation Action Team (CAT) was established on January 16, 2004 with a mandate to assist in the creation of a conservation culture in Ontario and make demand management a cornerstone of Ontario's long-term

energy policy framework. The Team's role, as announced by the Minister of Energy, was to champion conservation by:

- promoting the government's conservation initiatives;
- engaging stakeholders to seek out and promote best practices;
- developing a framework to assist in meeting the government's target of five per cent reduction in electricity consumption;
- working to identify and remove barriers; and,
- exploring ways for government policies and programs to incorporate conservation principles.

The Team's members represented a range of government ministries, providing outreach to a broad group of stakeholders and facilitating linkages to sector-specific opportunities for energy efficiency.

Terms of Reference

The Conservation Action Team adopted the following terms of reference:

The Team will engage sector specific stakeholders (e.g. agriculture, business) and provide outreach to these organizations.

The Team will assist government's efforts to lead by example in its own operations and those facilities that receive significant provincial funding (e.g. schools and hospitals).

The Team will work to identify and initiate the removal of any unnecessary barriers to conservation, which are embedded in government policies, programs, procedures, codes and standards consistent with the government's philosophy to find new and better ways to do business.

The Team will encourage ministries to integrate conservation in new policies and programs (e.g. educational curriculum and building codes).

Role and Operation

Individually, the role of Team members was to champion conservation, including energy efficiency, renewable energy, and distributed energy. As team members, parliamentary assistants assisted by screening policies and programs of their ministries to ensure they facilitated rather than discouraged conservation. Team members also acted as liaisons with ministry and geographical stakeholders.

Collectively, the role of the Team was to act as an advisory committee for the framework by: providing input to the plan including communications plans and programs; integrating cross-ministerial conservation activities; acting as a network to share information, successes and challenges; and, reporting on achievements and challenges.

The Team met 15 times between January and December 2004 (typically one morning meeting bi-weekly), receiving briefings from over 300 organizations, individuals and companies.

These sessions were an opportunity for stakeholders to discuss issues and opportunities, educate the Team about new technology and services, and suggest policy direction and collaborative projects for the government to

consider.

Parliamentary assistants also met with stakeholders individually, attended conservation related forums with constituency groups and community associations, as well as conducted site visits of innovative technology. During the final meetings of 2004, parliamentary assistants also reported on and led a discussion of barriers specifically related to their ministry's policy and programs.

Government Policy Context

In its January 2004 report to the Minister of Energy, the Electricity Conservation and Supply Task Force recommended that Ontario needed a conservation culture to deliver cumulative and sustainable improvements in energy use and demand response. The government responded with several announcements to set the foundation for a conservation culture.

The Conservation Action Team was established, as well as a conservation target of a five per cent reduction in peak electricity demand (equal to 1,350 megawatts) to be achieved by 2007. In order to lead by example, a ten per cent target was set in the government's own operations (equal to 62 million kilowatt-hours).

New legislation, the Electricity Restructuring Act, 2004, was passed to reform the sector and provide an institutional infrastructure for demand management. Under the new legislation, a Conservation Bureau will be housed within a new Ontario Power Authority, and headed by a Chief Energy Conservation Officer. While the Minister of Energy retains directive power to set conservation targets, the Bureau will be responsible for developing plans to meet these targets and administering demand-side management programs.

An interim two-tier pricing plan was created to encourage conservation, and the Ontario Energy Board was directed to develop a new rate plan that will encourage time-differentiated rates and wise use of electricity.

Targets to provide smart meters - meters designed to measure the time of day when power is consumed and allow consumers to provide demand response by shifting their consumption to off-peak hours - to complement time-of-use rates were announced. By 2007, 800,000 smart meters are to be installed and every consumer is to have a smart meter by 2010.

Local distribution companies (LDCs) were allowed achieve their full commercial rate of return on the condition they invest an amount equivalent to one year's worth of this money in demand-side management programs (up to $163 million).

Action was also taken to encourage renewable energy with the issuance of a request for proposals. Contracts for ten projects - including wind, small hydro and landfill gas - amounting to 394 megawatts of capacity were signed. The government partnered with the Lynn Cattle Company to invest in an anaerobic digestion facility to produce power at the company's operations and sell 2,500 megawatt-hours of power annually to the municipality of North Middlesex. Rebates of the retail sales tax are provided for solar energy systems installed in residential premises and similar rebates are proposed for small hydro, micro-turbines and geothermal systems.

Taken together, these measures signal a reversal of the former approach to energy policy, which considered

conservation as an afterthought. Over the past two decades, Ontario's policy has evolved from the hardware focus and incentive approach of the 1980s through the market-based solutions of the 1990s, whose emphasis on supply neglected how the market would encourage demand response.

Today, a new approach is developing that includes a role for regulatory standards and well-functioning markets but with an emerging focus on consumer behaviour and community involvement. This approach incorporates people, devices and regulated markets. The challenge of the Conservation Action Team has been to establish the commitment to conservation as central to energy policy, lead stakeholders in this direction, and engage Ontarians to adopt this approach.

Consultations - Who We Met and What We Heard

The Team received presentations from a diverse group of stakeholders (see Appendix B), gaining both breadth and a depth of knowledge through these consultations.

Presenters included associations that advocate for conservation and renewable energy, as well as groups who represent building and water works operators, the agricultural community, small business, large energy-intensive industries, schools and post-secondary institutions. Companies marketing new technologies, economic consulting firms, LDCs, municipal departments, local chambers of commerce and energy service companies were also consulted.

In addition, briefings on energy issues were provided throughout the year by staff from several ministries and agencies, and there was close liaison with staff of Ontario Conserves - responsible for continuing the dialogue between citizens and their government, it is consulting and educating the public on conservation.

The Team participated in several hands-on site visits: the Kortright Centre for a demonstration of leading-edge technology, Woodstock Hydro to learn about its pay-as-you-go billing, and a smart meter workshop with manufacturers.

The views and issues discussed during consultations are summarized below under several broad themes. Views often expressed related to working together with government, the need for government commitment and leadership, financing and incentives to overcome the incremental costs of conservation and renewable energy, reforming regulations, codes and standards, and providing outreach and education.

Opportunities for Partnerships and Action on Conservation

All stakeholders expressed a willingness to partner with government on joint projects. Examples of existing partnerships for market transformation were offered as the type of programs that government could join, endorse, assist or emulate. Among others, these included Toronto's 20/20 Way to Clean Air, the One Tonne Challenge, Mayors Megawatt Challenge, Green$aver, Cool Shops, Keep Cool, Energy Wise, the LEED building rating system.

Many stakeholders pointed to the expertise and capabilities that exist in Ontario. Stakeholders offered their

services as a formal or informal advisory body. Some expressed particular interest to work together on specific issues like building codes and equipment standards to drive further efficiencies, perform energy audits, make socially assisted housing energy efficient or raise public awareness.

The Team received advice to make conservation easy and accessible by involving non-government organizations (NGOs) since NGOs enjoy public trust, and are a knowledgeable cost-effective resource with programs already in place. The Team was also told that conservation could be made attractive through rewards type programs or by levering private sector participation to reach consumers at point of purchase. Stakeholders believed this would build a viable conservation culture that the old approach of handing out free light bulbs, for example, did not.

Many who endorsed this approach framed government's role as one of setting policy, standards, targets and facilitating access to capital while pushing the front-line work down to third parties, the voluntary sector, utilities, building operators and others.

A host of suggestions on action that could be taken were provided. Examples of some specific areas or sectors for proposed activities included the following.

Initiatives offered with respect to the built environment were to update building codes, adopt the LEED (Leadership in Energy and Environmental Design) green building rating system for government's own buildings or investment in facilities, streamline permitting systems for energy efficient buildings, provide labeling systems for buildings to educate home buyers, and provide training and workshops for building operators.

In the education and training sector, it was suggested that delivery models like EcoSchools (a partnership of school boards, teacher associations, government and NGOs) could be expanded across the province to reduce energy use in schools and provide classroom materials on conservation. Existing programs, such as those at Seneca College in Toronto, could provide training about energy use in buildings. Performance-based training could be developed through colleges, and research conducted through the new Centre of Excellence for Energy.

The Team learned that the energy-intensive operations of water treatment facilities are an opportunity to save energy. It was suggested government work with the sector to provide pilots, workshops and best practices. New MUSH capital infrastructure should include energy savings requirements.

In the retail sector, opportunities for lighting retrofits, upgrading HVAC and performing energy audits in shopping malls and stores were indicated.

Communication, Outreach and Education

The need for education and building awareness was raised on several occasions. Business representatives noted best practice case studies that exist, like Interface Flooring, Unilever Canada and Swiss Chalet restaurants, and could be used to inform other companies.

Some stakeholders suggested educating consumers at the point of purchase as they shop for equipment, fixtures and appliances. Others suggested awards programs that could be offered through retailers to heighten awareness. The Team also received ideas on educational software to assist consumers.

Renewable Energy

A range of advice was received about renewable energy. General comments were made on the benefits of renewable electricity and distributed generation as being modular and flexible, adding reliability and robustness to the grid. Proof positive of the viability of renewable energy is the success of other countries in its development.

The 300-megawatt renewable RFP (Request For Proposal) was commended as a good start but stakeholders emphasized the need for government leadership in setting a renewable strategy or policy framework. Without it, they feared the decision by default would be to operate coal and build more nuclear plants. Renewable energy associations also called for creation of a renewables bureau, like the conservation bureau, as a central point of contact to address policy issues, exploit manufacturing opportunities and champion development.

Some wind power advocates noted the role that local community co-operatives can play in developing wind power. Co-ops enjoy acceptance by residents, community buy-in, and provide local economic development. "Advanced renewable tariffs" were proposed as a possible alternative to subsidies and tax credits. Streamlined interconnection and a permitting process that expedites installation in rural/agricultural areas were mentioned as areas for improvement.

A comprehensive list of issues that create barriers by raising the cost of wind power was supplied to the Team. Examples provided were: high property tax assessment compared to conventional generators, connection tariffs, environmental assessment thresholds, noise regulations, lease term limits, zoning and planning requirements. Other barriers mentioned were prohibitions on green marketing, and the lack of net metering.

Waterpower advocates echoed the need for a renewables strategy and bureau, and emphasized the large potential of water sites still undeveloped (possibly as much as 8,000 megawatts).

Solar energy advocates explained the industrial capability that Ontario has (six key companies), and requested action on the following barriers: standards for solar domestic hot water; tax incentives and a financing ESCO (Energy Services Company) for solar domestic hot water; net metering; feed-in tariffs for photovoltaic (PV); zoning regulations that facilitate passive solar; tax incentives for solar and disincentives that penalize conventional fuel sources in applications solar could fill.

The untapped potential for solar energy in schools and for heating swimming pools, as well as opportunities for PV in niche applications like cottages were mentioned. A solar roof program to shave summer peak demand was suggested. Integrating renewable energy and conservation into building codes to achieve net zero energy homes for new homes was promoted, and a pilot demonstration of several hundred homes was proposed.

Smart Meters

The Team was briefed about the implementation plan for smart meters, and agreed on the need for further study of smart meters, as well as the issue of individual or sub-metering in multi-unit residential buildings.

Representatives of Woodstock Hydro, which offers an innovative service to help consumers manage their electricity consumption, stated that pre-paid electricity should be available to those who want it. It can be combined with a "tracking device" made available in homes to monitor price and demand. The company's data showed that pre-paid metering enables significant conservation by giving consumers information on consumption patterns.

Barriers

Several stakeholders raised the issue of barriers faced by conservation. Those working to improve the efficiency of energy use in buildings mentioned high information/transaction costs, performance uncertainties, the incremental cost of efficient equipment, the inertia created by existing organizational practice, split incentives that mean building owners do not receive the savings resulting from implementing demand management, and difficulty securing financing.

The MUSH sector (municipalities, universities, schools and hospitals) faces financial barriers because of constrained budgets. Funding is flowed as a year-end allocation and does not allow for long-term planning, and money is often directed at immediate operation and maintenance needs. Training for building operators about energy efficient equipment and design is not adequate, and stakeholders do not proficiently articulate their training needs to government.

In other sectors, like retailing, the Team learned of similar financial, administrative and awareness barriers.

During the course of the past year, Team members learned the fact that even our own government structure on occasion acts as a barrier to implementing conservation, as the operation of ministries can create a silo effect.

In addition to those barriers to renewable energy noted above, wind proponents raised other barriers. These stakeholders indicated that detailed wind mapping is needed and the queuing system inhibits them from optimally accessing the grid. In some rural areas, the capacity of the transmission grid is limited and restricts development of turbines. At present, it remains difficult to obtain financing and there can be long payback periods for smaller capacity turbines. "NIMBY-ism" creates opposition to development and there can be a public perception that turbines are noisy.

Some groups interested in renewable energy, like the agricultural community, noted a general lack of information about renewables and the value of farmland to wind generators. In addition, environmental regulations restrict the fuel used in anaerobic digesters, and the Certificate of Approval system can inhibit the implementation of conservation measures. Regulations also restrict the production of useful steam (from bio-energy) by greenhouse owners. The agricultural community considers the paperwork to become an IESO (The Independent System Market Operator) market participant burdensome; and, opposes the proposed net metering regulation's restriction of generation for sale.

All renewable energy advocates stated that incentives (financial or market-based like emissions trading) would assist development, and some suggested that government provide a standard offer for renewable energy or a renewable portfolio standard.

Government Operations, Policy and Programs

The Team heard that the announced conservation targets should be treated as interim steps to a long-term sustained commitment to conservation. Several stakeholders favoured LDCs playing a central role in the delivery of demand-side management since they believed the approach had yielded positive results in the natural gas sector. Others stated that a system benefit charge should be applied to finance conservation.

Representatives of large industry indicated time-of-use rates are needed, as well as other financial incentives like

payment for demand response. Industry advised the Team on the factors needed for a successful conservation program: people, process, and results - that is, knowledgeable staff, an analysis of load, and appropriate metrics. Small business advised that there is a need for research into small and medium enterprise (SME energy use since it is diverse, and the government should give priority to business for smart meters.

It was proposed that a strategy was needed for how government could work with the voluntary/NGO sector to build conservation. Some stakeholders suggested new agencies should be created: a council to promote education about conservation, a bureau to coordinate renewable energy policy, a council to instill conservation into education and bring school boards together. Other stakeholders indicated the need to green the way Ontario learns. Ample resources, models and approaches have been developed but government commitment and support is necessary.

Some stakeholders and Team members themselves commented on the greater need for horizontal policy development within government, through cooperation and coordination across ministries.

Technology

The Team received presentations on the benefits and potential of several emerging technologies. Advocates of clean coal stated that improvements had been made with respect to emissions of chlorine, sulphur and mercury.

Companies involved in commercializing new technologies like gateway systems requested that government play a role in growing the market for bi-directional fibre-optic communications platforms for residential consumers. It was suggested that government could also play a role in mandating common protocols and standards for network hardware and software. An approach frequently mentioned by stakeholders for communications and renewable technologies was government involvement in pilot programs in selected communities.

Finally, the Conservation Action Team also learned about the technologies available to create energy from waste (EFW) and heard that there is a need for a champion for EFW using municipal solid waste. Team members believe that EFW may be an issue that makes its way on to governments' agendas, more likely for reasons related to land fill sites than energy supply. Furthermore, Team members felt EFW is a crosscutting issue that touches other policies, such as land use and green belt protection or assisting municipalities. For these reasons, the Team agreed it would be useful to further explore EFW options.

Short-Term Actions Undertaken

The Conservation Action Team undertook a range of initiatives in 2004-05, as an interim measure, until the Conservation Bureau develops and implements a long-term action plan. The team has been receiving regular updates on these activities - which were a response consistent with the views received during stakeholder consultations.

Agriculture, Small Business, and Industry	
Action / Program	**Description**

Energy Audits for Farms	Energy, OMAF and the OFA have developed a pilot energy audit program for farms and a complementary series of workshops. Agriculture is not a sector addressed by the federal EnerGuide program
Cool Shops	Small business energy conservation outreach program led by the Clean Air Foundation project is being replicated from its Toronto roots to three other Ontario communities including London, Ottawa, and Peterborough. Cool Shops staff distributes energy conservation tips and advice in this door-to-door program. This expansion pilot was launched in London on November 30, 2004.
Survey of the Industrial Sector	AMPCO conducted a series of written surveys and follow-up interviews with Industrial organizations to determine the DSM/Demand Response needs of industrial electricity users.

Buildings

Action / Program	**Description**
Energy Star for New Homes	Development of an Energy Star labeling program for new homes being piloted across Ontario by EnerQuality Corporation. The program works in tandem with the Federal government's EnerGuide for New Homes program.
Training Seminar on Energy Star for New Homes	he Ontario Homebuilders' Association developed a training seminar for builders on the new Energy Star for New Homes.
Net Zero Energy Homes Forum	On January 19th, 2005, the Ministry partnered with the Net Zero Energy Homes Coalition to bring together major stakeholders to chart next steps in the development of a net-zero energy home design concept.

Sustainable Buildings '08	With Ministry support, the Canadian Urban Institute is leading a bid for an international sustainable buildings conference slated for 2008.
Water Heater Design Competition	Supporting a design competition led by the Canadian Gas Association. The competition will award $250,000 to the designer of the most efficient and inexpensive gas water heater model.

Conferences and Workshops

Action / Program	Description
Conservation Summit	Energy and MOE funded the Conservation Council of Ontario's first annual "Conservation Summit" for over 200 participants on November 25th, 2004. Ministers Duncan and Dombrowsky delivered keynotes for the event that looked at ways the NGO community could support the government's call for a culture of conservation.
DSM Guide for LDCs	Energy at Work has developed an online guide for the LDCs on DSM programs and best practices.
Energy Conservation Industry Briefing	On September 8, 2004, CAT hosted a briefing for over 500 representatives from the conservation industry at the Liberty Grand. Minister Duncan was the keynote speaker
LDC Energy Conservation Briefing	On May 4, 2005, the Ministry of Energy hosted a one-day briefing session for LDCs, showcasing 24 successful DSM programs from across the province.

LDC Workshop	The Ministry of Energy hosted this conference to help LDCs in the planning and delivery of their DSM programs.
Queen's Park Lighting Exhibit	Over 50 MPPs and OPS staff and 14 exhibitors attended this one-day exhibit hosted by MPP Donna Cansfield to profile energy efficient lighting technologies.
Small Business Energy Conservation Trade Shows & Luncheons	On December 1, 2004, CAT partnered with the Scarborough Chamber of Commerce to present PowerSaver Energy Conservation Trade Show & Luncheon. Minister Duncan was the keynote speaker at the event, which was attended by over 400 GTA business representatives

Health Care Sector

Action / Program	**Description**
Green Health Care (Ontario Hospital Association)	Supporting delivery of the Green Health Care program to promote energy efficiency and environmental responsibility in the health care field across Ontario.
Greening Health Care	Working with the Toronto and Region Conservation Authority to develop energy performance benchmarks for the Greening Health Care program.

Low Income / Social Housing Sector

Action / Program	**Description**

ow-income DSM Strategies for LDCs	Working with the low-income housing community in Ontario, a coalition led by the Canadian Environmental Law Association has developed a set of DSM initiatives to be undertaken by LDCs to assist low-income households in reducing electricity consumption and costs.
Low-income Energy Assistance & Education Program	A pilot project is underway by Brantford Power in collaboration with the Ministry of Energy and Share the Warmth.
Social Housing Energy Management	The Social Housing Service Corporation has developed a pilot project with 20 social housing complexes and co-operatives across the province that will lead to centralized energy management services for 1,500 social housing providers representing over 250,000 units of non-profit, municipally-owned or co-operative housing.

Residential

Action / Program	**Description**
20/20 Way To Clean Air	This residential conservation program was advertised widely through 20 local papers including Metro and garnered participation of five new workplaces for employee lunch and learns including General Motors.
Eneract Diversity Outreach Initiative	This Chinese language conservation outreach program was featured and advertised in three local Chinese dailies, on Fairchild Radio, Omni TV and several other outlets. Eneract is now preparing a Chinese language conservation brochure and plans to reach out to South Asian and West Indian communities.

esidential Energy Conservation Forums	Eight public energy conservation forums have taken place in communities across the province, through the support and presence of MPP Donna Cansfield. In addition, over 30 MPPs from all parties have expressed an interest in hosting similar events in their communities in 05/06

Schools and Colleges

Action / Program	**Description**
EcoSchools	An innovative conservation outreach initiative targeted at schools with a focus on both simple operational improvements for energy efficiency and a set of conservation focused teaching materials.
Ontario Colleges Efficiency Project (Association of Applied Arts & Training Ontario)	Developing a prioritized needs assessment for energy efficiency capital and retrofits at Ontario's colleges.
Schools for the Future	On April 25 & 26, 2005, the Ministry of Energy partnered with the Ontario Education Services Corporation to deliver a two-day symposium for school board decision-makers from across Ontario to discuss conservation programming in schools and innovative capital financing for energy efficiency retrofits.

TRCA Energy Efficient Schools	Demonstrating how school boards could improve energy performance and savings through better school design and operation. Following the development of energy performance baselines for 20 York Region schools, the results and baseline information are being used to work collaboratively with other school boards to incorporate best practices into the design of 10 new schools slated for opening in 2006-7.

Recommendations

The Conservation Action Team recommends the following 30 specific actions, which address the barriers and issues raised by the many stakeholders with whom the Team consulted during the past year.

"We Must Build a Long-Term Conservation Strategy"

Conservation Bureau

1 Provide the discussion paper, The Framework for Ontario's Conservation Culture, to the Conservation Bureau as a starting point and as a work in progress.

2 Develop robust estimates of economic and market potential for conservation and renewable energy to inform both government target setting and LDCs' programs.

3 Assess and monitor the effectiveness of LDC conservation programs and any financial incentives LDCs receive to deliver programs to consumers.

4 Pursue sector specific strategies, working with industry and trade associations.

Future Role of the Conservation Action Team

5 Continue the Conservation Action Team to provide a mechanism for horizontal policy integration, to facilitate

cooperation between ministries, and as a communications link to the Conservation Bureau.

6 Develop new terms of reference and targets for the Team. Recast the Team's role and operation from a working committee meeting regularly and in frequent contact with stakeholders to an oversight committee meeting as needed to direct and monitor conservation activity in government policy and operations.

7 For matters related to horizontal work between ministries and for provincially funded capital projects, there should be an on-going measurement and accountability role for the Conservation Action Team. The future role of the Team is to provide due diligence, overseeing a newly established review process for evaluating progress on conservation.

8 Implement a communications strategy to formally notify ministers of the Conservation Action Team's report and recommendations, particularly to alert ministers to the above review process and advise that ministries will be responsible for outlining procedures taken to achieve progress on conservation.

"We Must Lead By Example"

In-House Program

9 We must continue to realize energy savings in government buildings. Management Board's in-house program, with its project-by-project technology-specific approach to retrofits, makes a positive start to this realization. Implementation of the recommendations contained herein will continue to build upon the existing commitments and program.

10 Implement benchmarking based on the LEED (Leadership in Energy and Environmental Design) rating system among similar classes of buildings; establish continuous improvement targets.

11 Ensure procurement policies and procedures reflect conservation and green energy objectives.

12 Require service providers and in house building operators to be trained and certified through training programs offered in Ontario, for example, Seneca College's program.

13 Ensure non-Ontario Realty Corporation managed facilities are included (e.g., laboratories of the ministries of Health and Environment, supportive housing).

14 Utilize innovative financing approaches for the Province's own facilities as well as the entire MUSH sector.

Provincially Funded Projects

15 Require LEED certification for all new buildings, facilities and major retrofits, which are eligible for provincial funding (capital or operating costs). LEED certification can reduce annual energy consumption by 30 - 40 per cent

above code at an incremental cost of two per cent.

Exploit Horizontal Opportunities

16 Accelerate the introduction of conservation and sustainability into the Kindergarten to grade 12 curricula by encouraging partnerships between teachers and the Ministries of Education, Energy, Environment, Natural Resources, Agriculture and Food to ensure the school curriculum successfully develops a conservation ethic in children.

17 Rejuvenate the energy management training capabilities among community colleges. Increase apprenticeships in energy management occupations leveraging the training centres established by some trade unions.

18 Put high priority on initiatives that provide multiple co-benefits, for example: energy from waste, anaerobic digestion of manure, water conservation.

19 Use energy conservation to improve the competitive advantage of Ontario's industries and small business and help them adjust to rising energy prices.

20 Leverage the job creation and economic benefits of conservation and renewable energy.

21 Leverage multi-disciplinary research and development in industry, colleges and universities with strong emphasis on conservation, renewable energy and clean generation technologies.

22 Encourage a portion of any research and development funding provided by ministries be committed to projects and initiatives for alternative and renewable energy sources.

"We Must Improve Our Codes And Standards"

Codes

23 Raise the energy efficiency standards in the Ontario Building Code. Harmonize codes with federal government codes.

24 Require all new multi-residential units (condominiums, co-operatives, apartments, and townhouses) to be individually metered. Determine how best to achieve individual/sub-metering benefits in other sectors including existing multi-residential units.

25 Remove barriers - either explicit barriers or ones created by omission - to conservation, cogeneration and emerging energy technologies embedded in agency codes and practices, including but not limited to the Ontario Energy Board, Electrical Safety Authority, Technical Standards and Safety Authority, Municipal Codes, Ontario Fire Code.

Product Standards

26 Increase the rate of development of higher efficiency standards for products and equipment.

27 Incent the removal of old, inefficient products from the secondary (resale) market and ensure proper disposal and recycling.

"We Must Reach 'Hard To Reach' Consumers and Those Most Vulnerable To Rising Energy Costs"

Low Income And Electric Heating Consumers

28 Build on partnership projects and new federal government initiatives to mitigate the impact of rising energy prices through concentrated efforts with social housing and low-income people not living in social housing, with specific attention to electrically heated homes.

29 Expand the availability of natural gas to currently un-serviced communities.

Language And Cultural Barriers

30 Encourage local distribution companies to make materials and services available that account for language and cultural barriers.

In addition to our recommendations, the Conservation Action Team strongly supports the resolutions, particularly those that address conservation, renewable energy and distributed generation, taken at the Ontario Liberal Party Conference in November 2004. For information, the resolutions are provided below.

Conservation

- Be it resolved that the Government of Ontario provide incentive programs for energy conservation to property owners and other energy consumers, including residential, industrial commercial and institutional consumers who decrease energy use, particularly in peak hours;
- Be it further resolved that the Government set annual energy conservation targets for its own operations and subsequently, work cooperatively to set targets for residential consumers, including homeowners and tenants, commercial and industrial consumers;
- Be it further resolved that the government of Ontario, through incentives, partnerships and consultation, encourage municipalities, universities, schools and hospitals to develop their own energy conservation plans;

- Be it further resolved that the Government develop a robust and permanent program to educate and engage school children, homeowners and businesses on effective strategies for energy and biomass conservation as a key element of good citizenship;
- Be it further resolved that the government of Ontario, in aid of the aforementioned education of school children, encourage a partnership between the Ministries of Education, Energy, Environment and Natural Resources with teachers to ensure that the elementary school curriculum successfully develops a sense of conservation values in children; and
- Be if further resolved that Conservation Ontario and local conservation authorities be included in both the education components of the initiative and the incentive programs.

Renewable Energy

- Be it resolved that the Government of Ontario encourage the use of renewable energy by implementing Advanced Renewable Tariffs which will allow distributed renewable energy; such as, but not limited to, solar, small hydro, wind, biomass and other forms of energy to be established by farmers, co-ops and locally owned enterprises and to market this energy on the provincial grid;
- Be it further resolved that the Government of Ontario make a subsidy available for the purchase and installation of all major "Green" technologies which can be utilized to provide energy for residential dwellings, offices businesses and industry (products such as geothermal heat systems, solar-assisted hot water heaters, heat pumps, small-scale wind generators, net metering equipment, etc.);
- Be it further resolved that the government of Ontario make appropriate changes in pertinent acts and regulations (e.g. the Planning Act and Building Code) to encourage the use of renewable energy;
- Be it further resolved that net metering be an important step in the Provincial energy policy to encourage small renewable initiatives; and
- Be it further resolved that grid owners be mandated to build out their Grids on a priority basis to green energy providers and that a price for green energy be set at a rate to allow for a fair rate of return for renewable energy investors to encourage generation.

Electricity Sector Reform

- Be it resolved that the government of Ontario utilize a balanced approach which serves to enhance opportunities for the broadest participation, innovation and creativity by all sectors, including all levels of government, in the Ontario economy in meeting Ontario's energy needs;
- Be it further resolved that the government of Ontario be responsible to plan, manage and control the long term (30 year) development of the electricity supply sector through its various agencies in order to achieve the multiple goals of supply security, system reliability, environmental conservation, minimal cost, and the equitable treatment of customers, particularly those vulnerable to the impact of high energy costs; and
- Be it further resolved that the Ministry of Energy develop a system to model various inputs on alternatives for the supply and demand parts of energy requirements in order to test different scenarios in advance as an aid to making informed, realistic decisions.

Transmission/Distribution

- Be it resolved that the Government of Ontario work closely with the federal government and neighbouring jurisdictions in the long term planning and development of the highly interdependent bulk transmission system in North America, with particular attention to enhancing the east-west Canadian grid; and
- Be it further resolved that in developing the transmission and distribution system, the Government of

Ontario balance community, economic, environmental and demographic concerns.

Transparency And Accountability

- Be it resolved that any source of existing or proposed energy supply be required to identify full life cycle costs and take full account of both the direct costs of generation and the indirect costs to public health and safety and the environment to ensure that there is full transparency and accountability, such that this provides critical components for making an informed decision for all Ontario today and into the future;
- Be it further resolved that the Government of Ontario report annually and in detail to the people of Ontario on all aspects of the electricity industry in Ontario, including an audit of existing and proposed facilities and decisions made with an assessment of the impact of the various types of energy generation on public heath and safety and the health of the environment;
- Be it further resolved to provide an ombudsperson with research resources to obtain this information, to demand replies and subpoena relevant bodies and to publish observations for the media and public;
- Be it further resolved that all publicly owned power companies, including local distributing companies, be subject to Freedom of information and salary disclosure laws; and
- Be it further that the government requires full transparency in all contracts between the electricity grid operator and all electricity generators including transfer pricing, infrastructure build-out costs and other technical and audit costs.

Supply Mix

- Be it resolved that the Government of Ontario revise the Ontario Building Code and other legislation to remove barriers to distributed generation. The government should develop policies for the operation of local distribution companies to favour distributed energy technologies;
- Be it further resolved that the Government of Ontario remove disincentives (e.g., Building Code) and encourage (through incentives to single residential dwelling developers, multiple unit residential, and multi-unit commercial developers) to install building-based generation technologies including passive systems within their new and existing buildings;
- Be it further resolved that the Government of Ontario recognize that an appropriate supply mix consists of a balance of the following which builds on the strength of our existing electricity generation system and its highly skilled work force:
    - A viable nuclear component that utilizes installed and new capacity,
    - A hydro-electric component that includes both large and small scale facilities,
    - A fossil fuel component provided it is "clean", and
    - A renewable component that would include but not be restricted to wind generation and biomass; and
- Be it further resolved that the government ensure that renewable and high efficiency generation is the preferred option for all new sources of energy, including Ontario's stranded, flared and marginal natural gas which can be converted into electricity on site and sold into the grid, and that aggressive targets be established to meet this end;
- Be it further resolved that the Province of Ontario work with municipalities to permit distributed generation and due to the urgency of our energy supply problems that this proposal be expedited as quickly as possible; and
- Be it further resolved that the province of Ontario undertake education programs that assist in the elimination of the regulatory delay barriers to new project implementation which are a result of a lack of public knowledge or misconceptions specifically with regard to nuclear and transmission options.

Low Income Consumers

- Be it resolved that the Government of Ontario support an energy efficiency program for low income energy users which would help the Province achieve its goals for conservation and reduced energy use while at the same time serving to alleviate the disproportionate energy cost burden faced by Ontario residents of lower income. Energy efficiency measures that would receive financial support would include, but are not limited to, weatherization (retrofitting), furnace replacement and light bulb replacement and smart metering (including retrofitting) of properties occupied by low-income consumers; and
- Be it further resolved that the Government of Ontario enact regulations that ensure that all new housing, including rental units, and retro-fit projects meet exacting energy conservation targets for the building as well as for furnaces and other electricity using appliances in the building and that smart meters are required in all new units, including units in multi-unit buildings; and
- Be it further resolved that the Government of Ontario work with suppliers of housing for low income tenants to measures are undertaken to reduce energy use in existing units.

Appendix A — List of Stakeholders Consulted

Collectively, the Conservation Action Team, and individually, Parliamentary Assistants, met with the following stakeholders:

ABB Inc.

Aggregate Producers of Ontario

API Group

Apotex Inc. Pharmaceutical Co.

Aranly Corp.

ARISE Technologies

Association of Architectural Technologists

Association of Canadian Distillers

Association of Major Power Consumers in Ontario

Association of Municipalities of Ontario

Association of Power Producers of Ontario

Association of Registered Interior Designers of Ontario

City of Atikokan

Atomic Energy of Canada Limited

Automated Tooling System

Atwood Pet Food

B&B Consulting

BC Hydro

Beaver Power Corporation

Bill Kemp Home

BIOX

Bluewater Power Distribution

Borden Ladner Gervais LLP

Boreal College

Bowater Inc.

BP Canada

Brantford Power

Brascan Power Corp.

Cadsoft Corporation

Calpine Corp.

Cambrian College

Cameco Corporation

Canada Housing Mortgage Corp.

Canadian Appliance Manufacturers Association

Canadian Bioenergy Association

Canadian Electricity Association

Canadian Energy Efficiency Alliance

Canadian Federation of Independent Business

Canadian Gas Association

Canadian Hydro Development Inc.

Canadian Institute

Canadian Manufactures and Exporters

Canadian Motor Vehicle Manufacturers Association

Canadian Niagara Power

Canadian Renewable Fuels Association

Canadian Wind Energy Association

Cement Association of Canada

Centennial College

Centre of Excellence for Energy

Centrica North America

Chambers of Commerce (across Ontario)

Changing World Technologies

Chartered Accountants of Ontario

Christian Farmers Federation of Ontario

CIBC World Markets

City of Clarington

City of Hamilton

City of Ottawa

City of Peterborough

City of Toronto

Classroom Connections

Clean Air Foundation

Clean Air Partnership

Clean Water Foundation

Clear Air Alliance

Coal Association of Canada

Coco Group

Cole Freight Incorporated

College of Medical Laboratory Technologists

CoMate Inc.

Commercial Alcohols Inc.

Community Social Planning Council

Confederation College

Conference of the Reducers

Conservation Council of Ontario

Conservation Task Force

Constellation Energy Group

Contact Exposition Mgmt

Contractor - Bruno Giammaria

Canadian Petroleum Products Institute

Canadian Union of Public Employees

David Suzuki Foundation

Demand Energy

De Vries, John & Irma

Direct Energy

DST Output

DTE Energy Technologies Inc

Earth Rangers

Echo Energy Canada Inc.

Eco-Schools

Ecosystem

Eco-Watt Inc.

Education Connections

Education Network of Ontario

EEON Environmental Education Ontario

Electricity Distributor's Association

Elementary Teachers Federation

EM Research Associates

EMCO Corp.

Enbridge Gas Distribution Ltd.

Energron Canada

Energy Conservation Reflective Technologies

Energy Market Investment Group

Energy Solutions Conference

EnerLife Consulting

Enersource Hydro Mississauga

EnerSpectrum Group

Enerworks Inc.

Environmental Education Ontario

Enwave Energy Corp.

EPCOR

Evergreen Energy Corporation

Excalibur Communications

Fair Rental Policy Organization

Foothill Greenhouse

Ford Motor Company

Free Breeze Energy Systems

Friends of Second Marsh

GE Canada

Gentile Engineering

George Brown College

Gerdau Ameristeel Corp

Goodlife Fitness

Gowlings LLP

Greater Toronto Apartment Association

Green$aver

Greening Ontario's Future Conference

Greenwin Properties

Grey County Planner

GTA Clean Air Council

GTAA Co-generation Initiative

Guelph District School board

Hamilton Utilities Corp.

Homeworks

Honda Canada

Honeywell

Humber Arboretum

Humber College

Huron Perth Wind Power

Hydro One

Hydro Ottawa

IBEW Power Council of Ontario

IDM Ltd.

Iogen

Impactanation

Independent Electricity System Operator

Industry Canada

International Sustainable Buildings Exhibition

JP Morgan Chase Co.

Kalaesi Farm

Kearns Disintegration Systems Canada Ltd.

Keen Engineering

Kilowatt (Kill-A-Watt) Hour

Kimberly-Clark

Kiwanis Club

La Cite College

Lahren James Inc. Energy System Specialists

Lakehead University

Landsend Corporation

Learning for a Sustainable Future

Leader Wind Group

Ledcor Industrial Maintenance Ltd.

Legend Power

Light Studio

Living Green Expo

London Hydro

Loyalist College

Lynn Cattle Farm

Markham Conservation Office

Mayor of Tecumseh & Board for Essex Power

McLuhan International Festival

MCW, Light Heat Cool Ltd.

MDS Inc

Media Profile

Metro Urban Communities Inc.

Michael Coren Live

Miller Thompson LLP

Mondial Energy

Moroccan government representatives

Municipality of Chatham

Munk Centre for International Studies

N/Ergy Solutions

National Farmers Union

Natural Resources Canada

Navigator Ltd.

Niagara Erie Public Power Alliance

North Toronto Green Community

Northland Power

NRGen

New York Power Authority

Ontario Association Certified Engineering Technicians & Technologists

Oakville Hydro Energy Services

Office of Energy Efficiency, Natural Resources Canada

Office of the Premier of Ontario

Ontario Institute for Studies in Education

Olameter Inc.

ON Power

Ontario & Toronto Auto Dealers' Association

Ontario College of Teachers

Ontario Association of Radiologists

Ontario Centre for Environmental Technology Advancement

Ontario Clean Air Alliance

Ontario Corn Producers

Ontario Dental Hygienists Association

Ontario Electrical Construction Ltd.

Ontario Electricity Distributors

Ontario Energy Alliance

Ontario Energy Board

Ontario Environmental Industry Association

Ontario Federation of Agriculture

Ontario Forest Industries Association

Ontario Greenhouse Alliance

Ontario Homebuilders' Association

Ontario Horse Racing Industry Association

Ontario Hospital Association

Ontario Mining Association

Ontario Pork Producers Association

Ontario Power Generation

Ontario Printing and Imaging Association

Ontario Real Estate Association

Ontario Residential Care Association

Ontario Sustainable Energy Association

Ontario Trillium Foundation

Ontario Undergraduate Student Alliance

Ontario Waterpower Association

Ontario Windsmith

OZZ Corporation

Pembina Institute

Platform Group International

Platts Research and Consulting

Power Worker's Union

PowerGen Corp.

Prolink North America Inc.

Provincial Council of Women

Public Perspectives Inc.

Queen's University

RDII Consulting & Technologies Inc.

Refrigerator Recycling

RenewAbility Energy

Renewable Energy Task Team

Renfrew County

Rentec Renewable Energies Inc.

Rescue 7 Inc.

Retail Council of Canada

Rothsay Recycles

Roundtable on Heritage Conservation Districts

Sault College

Schlumberger Ltd.

Shadd Foundation

Sherritt International Corp.

Siemens AG

Sierra Club of Canada

Sir Sandford Fleming College

Sithe Energies Inc.

Sky Generation Inc.

SkyPower Corp

Social Housing Services Corporation

Soy 20/20

Soybean Growers Association

Spi Group

Stelco Inc.

Studio 2

SunCor Energy

Sustainable Energy Technologies

Terra Power Systems

Thunder Bay Hydro

Topia Energy Inc.

Tormont

Toronto & Region Conservation Authority

Toronto & York Region Labour Council

Toronto Atmospheric Fund

Toronto City Council

Toronto District School Board

Toronto Firefighters of Ontario

Toronto Hydro

Tourism Toronto

Trans Alta

TransCanada Pipelines

Trent Hills & District Chamber of Commerce

Trent University

Tridel Corporation

Trillium Health Care Centre

Trillium Hospital (Queensway)

Ukrainian Canadian Care Centre

UNESCO (Canada)

Union Gas

University of Toronto

University of Waterloo

University of Windsor

UPI Guelph

Upstream Wealth Management

Urban Development Institute

Vector Wind Energy Inc.

Vermont Utilities

Vestas

Wellseyville Generator

Woodstock Hydro

Zephyr North

Appendix B — Best Practices and Demonstration Sites

Each of the following institutions will receive a certificate of leadership from the Minister of Energy and have been recognized by the Team for their sustainable energy practices.

Earth Rangers Centre

The Earth Rangers Centre is a 5800m^2 wild animal treatment and rehabilitation centre and educational institution owned by Earth Rangers and located at the Kortright Centre for Conservation, in Woodbridge Ontario. It is the most energy efficient education and health care facility in Canada, and the use of concrete makes a significant contribution. Annual energy use is calculated to be 65% less than required by the Model National Energy Code for Canada.

The project had a number of challenging design requirements. The rehabilitation rooms and treatment areas had to be:

- Durable enough to accommodate the tough patients—deer, large predators, raccoons, etc.,
- Offer no escape or hiding places for the small or flying patients—songbirds, raptors, small predators, etc.
- Withstand the humid or wet environment of the waterfowl and beavers, and
- Provide a healthy environment conducive to the speedy recovery of all.

Ventilation rates are high, which is typical of human health care facilities, yet energy use had to be as low as best available technology allows—the target was a 50% energy reduction compared to Code. The result was a 63% reduction.

Another Wildlife Centre mandate was to demonstrate innovative technologies to achieve these objectives and to qualify for certification under the Leadership in Energy and Environmental Design (LEED) standard of the Green Building Council.

Sustainable Construction Features

- Solar Panels to heat domestic hot water
- Use of local materials
- Natural Lighting
- Energy Efficient Windows
- Highly insulated floors (R30), Roof (R30) and Walls (R20)
- On site water treatment for reuse (potable)
- Limited use of additional finishing materials on interior and exterior to retain exposes concrete
- Less energy use in maintenance
- Eco Pave that charges rainwater back to the aquifer.

Peel Region

The Region of Peel was the first government in Canada to achieve the National Quality Institute's (NQI) prestigious Canada Awards for Excellence (CAE) - Silver Level. The Region of Peel was recognized for applying principles of excellence to its business practices. For example, as part of its continuous improvement philosophy, the Region annually introduces improvements to the way it manages its programs and services. Among these, the Region has adopted a rigorous corporate planning process; regularly measures employee satisfaction; and, has renewed its focus on customer service.

Corporate Energy Management (CEM) is a division within the Finance department of the Region of Peel. Formed

in 2003, Corporate Energy's mandate is to manage the Region's energy portfolio in an economical and sustainable manner, while promoting the wise use of energy to maintain a healthy environment.

This division works with other departments to set energy efficiency standards and procedures to ensure the Region remains up-to-date with the latest in energy efficient technology. Corporate Energy will fulfill the Region's need for reliable and cost effective energy supply and management while positioning the Region of Peel as a leader in energy efficiency.

Some of Corporate Energy's latest activities include energy efficiency audits, building retrofits, exploring opportunities for renewable energy, bi-fuel generation, demand reduction programs and providing general advisory services to all internal departments.

CEM is working with and continuing to become part of many committees such as the Regional Air Quality Work Group, Association of Municipalities of Ontario - Energy Advisory Committee and the Greater Toronto Area Clean Air Council.

Additionally, Corporate Energy hosted a National Resources Canada Energy Manager's Network meeting for staff from other municipalities, the commercial/industrial sector, hospitals and school boards to share ideas and best practices in energy management and reduction.

The Corporate Energy team also provides leadership by speaking at various conferences and workshops on energy initiatives currently being undertaken by the Region of Peel such as the recent Caledon Energy Show, which included demonstrations on proven ways to save energy - and money - at home, at work and on the road.

Fleming College

Fleming College officially opened its new $10.2-million environmental technology wing at the School of Environmental and Natural Resource Sciences in Lindsay on Monday, October 18. The 42,000 square foot wing is one of the most environmentally sound commercial buildings in Canada, achieving this through the material used in its construction, an extensive ground heat system, the installation of a wind turbine for power generation and the treatment of the building's wastewater with a series of constructed wetlands located in the courtyard of the campus.

Designed to demonstrate the use of green technology, the new wing contains an interconnected living laboratory and interior discovery trials. It will have a green roof that will serve as a research platform for developing green roof technology. The wind turbine, a joint project with Ontario Power Generation, will not only provide power for the building but also will be used as a teaching tool for students.

The new Centre reinforces Fleming's leadership role in the area of environmental conservation for Alternative Wastewater Treatment. This unique facility will research and test constructed wetland designs suited specifically to the cold Canadian climate. Funded by $1.34-million in infrastructure grants from the Canada Foundation for Innovation and the Ontario Innovation Trust Fund, the centre will allow constructed wetlands research to achieve a scope and focus that does not presently exist in Canada. The centre will play a significant role in the training of students in the Environmental Technology program and Fleming's new Bachelor of Applied Technology in Environmental and Assessment Management.

The wing also contains the Geomatics Institute at Fleming with over $12-million in funding and support. This includes a $1.57-million grant from the provincial government's Strategic Skills Investment fund used to purchase state-of-the-art equipment for the Institute. The Institute delivers geomatics post-secondary education and customized training for industry and government.

Fleming's Environmental Technology Wing: Highlights

- The wing is one of the most energy efficient buildings in Canada, according to Natural Resources Canada and its Canada Building Incentives Program. The wing is designed to perform at 66 per cent above the requirements of the Model National Energy Code for Buildings (MNECB). The estimated annual energy savings, compared to an MNECB design, are more than $36,000.
- The building came in on its budget of $10.2-million and received a $60,000 grant from Natural Resources Canada under the Commercial Building Incentive Program (CBIP)
- The 42,000 square foot addition draws on the earth's temperatures for heat. There are 66 geothermal wells that are 122 meters deep bringing heat through an extensive system of coils that are nine kilometers in length. In the summer, the system reverses itself, drawing heat from the building. A mini- utility room adjacent to the biodiversity lab contains the pumps and heat exchangers for the system. Five of the wells are located under the Discovery Trail, with one left exposed and covered with Plexiglas.
- Excess heat from the new wing is used to prevent freezing in the constructed marshlands that are part of the Centre for Alternative Wastewater Treatment
- Heat that would normally leave the building through venting is captured and used to heat the incoming air using the HVAC unit above the library
- A wind turbine located at the rear of the building can provide up to 10 kilowatts of power, about 16 per cent of the energy used by the wing. The turbine is a project developed with the support of Ontario Power Generation and will be used to help students learn about alternative energy resources and to determine the best locations for future wind power generation. A weather station is located about 100 metres past the wind turbines. It measures the wind speed, wind direction and temperature related to the turbine's electrical production.
- Lights throughout the building turn on and off or up and down depending on the level of activity in the room as well as the amount of external light coming through 14 skylights in the library
- A portion of the roof above the library and the biodiversity commons is built at a 45 degree angle to the sun. As the cost of electricity increases and these features become more economically viable, the college can add solar water heaters and photovoltaic cells.
- Durisol blocks of low-grade chipped wood are used instead of concrete block, providing higher insulation values than concrete. The building uses a high rate of insulation.
- The new wing will have a green roof that will reduce sediment going to local stream and rivers, reduce the urban heat island effect, reduce cooling costs in summer and provide urban green space to support biodiversity and urban ecosystems. The roof will be a research platform for green roof technology
- The new wing is constructed with recycled steel, plastic and wood and contains materials that are recyclable at the end of their life. Concrete is used extensively for floors. Where carpet is used, it is 40 per cent recycled and 100 per cent recyclable.
- The location of the building is an important energy efficiency feature. Sitting on an east-west axis, it captures more sun. Its single story and its sheltered location protect it from the wind.
- As a research initiative, Fleming's Centre for Alternative Wastewater Treatment can treat about 3,000 liters of wastewater a day from the new wing. The Centre's wetland cells can collect wastewater from the washrooms located in the Environmental Technology Wing. In addition, holding tanks inside the greenhouse can be used to send other kinds of wastewater to the wetlands for treatment. Over several days,

the wastewater is converted to a purified state through bacteria, fungi, microorganisms and natural chemical and physical transformations. Areas of research at the Centre include: understanding how wetlands function in cold climates, the removal of phosphorous and toxic organic compounds, the development of affordable, modular constructed wetland systems for a wide variety of uses.

- The Earth Observatory monitors magnetotelluric activity and seismic events. It also monitors key building operations by tracking data on how the ground source heat pumps are working, or electrical power from the wind turbine. Fleming's Magnetotelluric Observatory is operated for the Geological Survey of Canada as part of a Canada-wide network. The college also houses one of the POLARIS (Portable Observatories for Lithospheric Analysis and Research Investigating Seismicity) Seismic Observatories to track earthquake activity.

Thomas L. Wells Public School

Thomas L. Wells Public School in the Morningside Heights Community is a new 63,160 square feet K-8 Public School to accommodate up to 668 students. The project will be located at 69 Nightstar Road in a brownfield site in the new subdivision of Morningside Heights in Northeast Toronto.

Consistent with the Toronto District School Board's mandate for the project, a prototype school for deployment on compact suburban sites been developed by TDSB according to the principles of sustainable design. The finished project, once operational is expected to dramatically reduce building operating costs from both an energy consumption and maintenance perspective as a result of both the project design and material deployed in its construction.

The two-story building is typically constructed as a structural steel frame in filled with pre-cast concrete floor and roof slabs. The building envelope and systems have been designed as an integrated whole to achieve the sustainable design ambitions for this project. The primary cladding for the project is brick veneer with pre-cast coping over CMU backup. The building has a high performance envelope and has been designed to achieve R20 in wall assemblies and R30 (min) in roof assemblies. High performance aluminum glazing systems are utilized throughout incorporating sealed units with low e coatings and ceramic frit at some locations. Operating vents will provide passive ventilation and have been provided to all program areas.

Gymnasium, art and science areas are provided natural daylight though skylights. South facing building facades utilize a combination of architectural pre-cast concrete and stainless steel sun shading systems to passively defend glazing from summer heat gain while permitting passive heat gain through thermal mass in winter.

Project specifications will demand a continuous high-performance building envelope is achieved across all assemblies. Landscape detailing includes provisions for a demonstration - scaled on site storm water storage system, irrigation cistern, and limited area of "green roofing".

Mechanical Systems include integrated DDC controls to monitor building systems and permit ongoing project and efficiency monitoring by the owner following construction. Heating is delivered to a majority of program areas via hydronic in floor radiant heating.

High efficiency boilers, domestic hot water tanks and heat recovery systems incorporated into air handling units reduce operating energy demands. The project may incorporate a geothermal ground source heat pump energy system for heat rejection, and will utilize auto sensing washroom fixture and low flow fixtures.

Electrically, the project includes an integrated central lighting control system complete with local wall box dimmers, photocells and occupancy sensors. All luminaries within classrooms are dimmable and are equipped with 0-10VDC controls. Non-classroom fixtures are connected to the centralized processor through switching panels, which in turn is connected to the building fire alarm system and building automation system. An inverter lighting system is utilized to provide emergency lighting throughout the project.

Trillium Health Centre

On June 24, 2004, The International Organization for Standardization (ISO) recognized Trillium Health Centre's progressive Environmental Management System (EMS), making Trillium the first multi-site hospital in the world to be awarded ISO 14001 registration.

Trillium has recently entered into an eight-year contact with Johnson Controls Inc. for energy conservation measures and facility improvements that will result in over $700,000 in annual energy savings. The energy management project costs will be just over $4 million and the Chiller Consolidation project will be $3.8 million. The energy management project includes high efficiency lighting, heat recovery and power factor correction.

Achievement of ISO 14001 registration clearly shows Trillium's dedication to protecting the environment. The environmental management programs address key environmental impacts, including Energy Conservation, Water Quality, Hazardous Materials Management, Waste Reduction, and Emissions Management.

Located in Mississauga, the Trillium Health Centre is dedicated to protecting the environment, which includes:

- Implementing best management practices, procedures, and technology to avoid or reduce pollution resulting from hospital operations;
- Monitoring the natural environment and our discharges to the environment to understand better our environmental impacts and to track progress toward achieving objectives and targets;
- Undertaking to comply with relevant environmental regulations, standards and codes of practice;
- Conserving energy through efficient use and operation;
- Working to identify acceptable alternatives to hazardous materials and managing those we continue to use in a manner that will reduce potential impacts;
- Minimizing waste generated by our operations and recycling wastes where practicable;
- Maintaining open communication with neighbouring communities and other interested parties;
- Continually improving environmental performance through environmental audits, participation in hospital industry associations, consultation with interested parties and periodic reviews.

Trillium's do-no-harm program for the environment has reduced our impact on everything from garbage to greenhouse gases (GHG). Moreover, the turnaround has paid off with financial and safety dividends.

By going green, the health centre has:

- Diverted nine tonnes of plastic a year from landfill by introducing a reusable container system for the disposal of sharps (needles, scalpels)
- Avoided more than 9,000 metric tons a year in GHG, such as carbon dioxide and oxides of nitrogen, being vented to the atmosphere
- Scrapped cleaning products whose contents threaten human and animal growth in the eco-system

- Eliminated the need for X-Ray films and solutions that may contain mercury by putting in a electronic imaging system
- Reduced needle stick injuries by more than 50 per cent by moving to the reusable system that restricts hand access to sharps items.

Trillium Health Centre is one of Canada's leading community hospitals, with expanding tertiary care programs in cardiac care, stroke, orthopedics and neurosurgery. Serving over one million residents in Mississauga, South Etobicoke and from other communities across the province, Trillium has redefined the boundaries of community health care delivery. Housing a model ambulatory care centre, the busiest Emergency service in the country, and the largest freestanding day surgery centre in North America, the two-site facility is attracting international attention for its innovative approach to the provision of health care services.

University Of Ontario Institute Of Technology

Canada 's newest university, the University of Ontario Institute of Technology provides a unique combination of academic knowledge, vibrant student life, leading-edge research and hands-on skills. The university offers career-focused degree programs and shares selected facilities with Durham College. Located in Oshawa, Ontario, the university welcomed its first students this September.

In keeping with its mandate on advanced technology, OIT is striving for LEED Gold Certification. Its approach to energy efficiency and sustainable design makes it a leader.

The drilling of a geothermal well field, - one of the largest in North America, has just been completed on the campus of Canada's newest university, the University of Ontario Institute of Technology. Three hundred and eighty-four holes, each drilled 213 metres (700 feet) into the earth will be linked to mechanical systems that will provide eight new university buildings with a highly efficient and environmentally friendly heating and cooling system. It took three rigs each digging one hole per day to accomplish the task. "If the holes were laid end to end they would stretch the equivalent of 80 kilometers (50 miles)-that's about from here to the Toronto International Airport."

The drilling is just the first step in the development of a thermal energy storage system that uses the earth's relatively constant temperature to provide a stable, low maintenance and efficient energy source. During the winter, fluid circulating through tubing extended into the wells will collect heat from the earth and carry it into the buildings. In summer, the system will reverse to pull heat from the building and place it in the ground.

The ground source thermal system is just one innovation in the development of the new university campus. This system will save 40% of heating energy and 16% of the cooling energy.

The other sustainability features include:

- A "green" roof on the first and largest academic building will also reduce heating and cooling costs and improve storm water management.
- High performance building envelope including high level of insulation, high efficiency windows, heat mirror window film and exposed concrete structure to provide thermal massing.
- Centrally controlled heating, ventilation and air conditioning plant.
- A displacement ventilation system, which promotes stratification to reduce colling load while enhancing

natural ventilation.
- "Breathing Wall" in the atria of some buildings to improve air quality.

University Of Ottawa Biology Building

In the design of the university's new biology building, a 56,000-square-foot research and teaching facility, the University of Ottawa used an integrated design team to create an exceptionally energy-efficient building. To meet this challenge, the team analyzed a variety of possible energy-saving measures and devised four distinct innovations:

- A curtain wall with thickened thermal breaks and insulated interior spandrels;
- A terminal cooling system that minimizes energy use;
- Growth chambers that enable recovery of waste heat; and
- Dual-sash fume hoods that are energy efficient, functional and safe.

From the outside, the University of Ottawa's new biology building looks like many other glass-walled structures. While others, however, lose significant amounts of heat because of the large glass surfaces and porous seams surrounding window panes, the school's design features high-performance window glazing, extra-wide thermal breaks and an added layer of insulation on the inside of the curtain wall's interior opaque sections to reduce heat loss.

The building's terminal cooling system saves energy by reversing the principles inherent in traditional cooling plants. Unlike conventional systems, which send cool air throughout buildings and then reheat specific rooms, the structure's system dehumidifies air only at the central unit. It then sends this dry, room-temperature air throughout the facility, where it can be cooled in individual rooms as required.

The structure's 37 growth chambers–where experiments are conducted under precisely controlled temperatures–presented a unique challenge. When cooled, these chambers act like large refrigerators, producing vast amounts of waste heat, which can raise room temperatures to uncomfortably high levels. Therefore, instead of traditional cooling systems, which utilize air-cooled heat exchangers, each growth chamber is equipped with a water-cooled refrigeration unit that captures waste heat and expels it from the building as exhaust. In winter, this excess preheats outside air that is used to warm the building.

The facility's 49 fume hoods, featuring an innovative dual-sash design like that of a sliding window, remove noxious air from laboratory work areas. The design reduces airflow within the hoods to levels 50 to 80 percent lower than in conventional fume hoods. The reduction in power that results from decreased airflow translates into significant energy savings, without any diminution of safety, performance or functionality.

With these four energy-saving features, the University of Ottawa biology building consumes a remarkable 73 percent less energy than a traditionally equipped building. This figure translates into estimated annual cost savings of $270,000. Since the four innovations cost only $440,000, the payback period is less than two years.

Husky Energy, one of Canada's largest energy companies, has provided a $500,000 donation that will create a "courtyard classroom" for students to work in and enjoy. The courtyard will be a centerpiece for the University's new biosciences complex. The complex's first phase opened in 2003, and has won awards for its energy efficiency. The courtyard will be completed in August 2005, at roughly the same time as the bioscience complex's third and

final phase. "The Courtyard will recreate a boreal forest and wetland environment, and offer students in the Faculty of Science opportunities to manipulate that environment and test their theories and learning.

Appendix C — Acknowledgements

Dominic Agostino, MPP for Hamilton East, served on the Conservation Action Team as the Parliamentary Assistant to the Minister of the Environment and passed away on March 24, 2004. His contribution to our work is gratefully acknowledged.

Others who provided valuable support are:

Sarah Baker, Ministry of Energy

Marion Fraser, Office of the Minister of Energy

Wade Frost, Ministry of Energy

Chris Green, Office of the Parliamentary Assistant to the Minister of Energy

Martin Whicher, Ministry of Energy

The following individuals in the offices of the parliamentary assistants also contributed to the work and operation of the Team.

Farrah Bourre

Scott Cavalier

Mark Fisher

Laura Herman

Travis Hoover

Jerry Khouri

Kristan Koehle

Craig Leroux

Amanda Mayer

Pat Melanson

Frederica Mintz

Charla Robinson

Rebecca Sciarra

Michael Simpson

Elizabeth Sositko

David Tyler

Appendix D — The Framework for Ontario's Conservation Culture

Table of Contents

Introduction
Ontario's Conservation Framework
Engaging And Educating Consumers
Encouraging Energy Retrofits
Ensuring Innovation In New Construction
Sustainable Funding For Conservation
Benchmarking And Best Practices
Load Management
Building The Conservation Industry
Encouraging Distributed Energy
Leveraging Additional Resources
Using Sector Specific Engagement Strategies
Appendices
Benefits Of Conservation
Benefits of Distributed Energy
Benefits of Smart Metering
Barriers To Conservation
Beyond Conservation

Introduction

Energy is a universal commodity - everyone uses and needs it - but most consumers do not pay it much attention, except when their bills increase. Energy use and costs are a complex product of energy prices, weather, equipment efficiency, system operations and individual behavior. As such energy consumption seems difficult to manage. While other household or business expenses receive a good deal of attention, with market forces driving efficiency and cost reduction, energy bills, however, tend to just get paid without detailed analysis. In any event, customers receive their bills long after the energy is consumed, when alternative courses of action could have been pursued.

As a result, the market for conservation does not function effectively. The "conservation industry" is fragmented, hard to access and capacity-limited. The essential elements of effective energy management - knowledge, resources, financing, incentive, and feedback - are mostly lacking, meaning consumers lack information to make reasoned choices. Price signals alone produce limited response.
The economic potential for
reducing energy demand in Ontario is considerable. Each year, Ontario businesses, residents, government and public institutions spend approximately $22 billion on energy for buildings and industrial processes, an amount greater than 5% of Ontario's gross domestic product.

Government leadership is needed to create an effective market for conservation - a market that includes energy efficiency and renewable energy.

Federal, provincial, utility company, municipal and private sector projects in other jurisdictions in Canada and in the United States have demonstrated energy use reductions of 20% to 30%. Realizing this kind of potential across Ontario would substantially reduce natural gas, electricity and coal imports into the province, which total roughly $7 billion annually, and defer some of the need for new supply facilities.

Clearly, Ontario has a significant opportunity to reduce energy costs for consumers, while creating jobs in the province and lowering greenhouse gas emissions through energy conservation. Systemic and sustainable energy conservation will come from an integrated range of actions, from low-cost awareness and education, through to the use of renewable energy, to building retrofits and higher standards for new construction.

The collective benefits of well-managed end-use energy across Ontario are far greater than the cost savings available to individual energy users. Ontario's energy consumers would take action to reduce costs if they had the knowledge and resources to do so.

Conservation principles need to be embedded in government policy, programs and regulations. Beyond that, specific, targeted programs are required to reduce Ontario's ever-increasing demand for energy and to reduce specific customers' demand for grid-supplied energy. Specifically, conservation includes:

- Improved energy efficiency for products, equipment and systems;
- Behavioral and operational changes, including application of benchmarking, interval meters or "smart" control systems;
- Load management: interruptible and dispatchable loads, dual fuel applications, thermal storage, and demand response;
- Fuel switching which reduces the total system energy for a given end-use; and
- Distributed energy: tri-generation, co-generation, ground source heat pumps, wind, solar and district energy/ neighborhood energy systems embedded within local energy distribution companies.

Ontario's Conservation Framework

The Ontario government is already holding itself to a higher standard for conservation. While it has called upon the province as a whole to reduce the growth in peak demand by 5% by 2007, it has adopted a target of 10% for its own facilities and Management Board is half way to achieving that target. The government recently announced it had negotiated an agreement to use Enwave Energy Corporation's Deep Lake Water Cooling System to reduce

energy use in government buildings at Queen's Park. In addition, it has implemented education and communication programs for government employees.

Ontario's Energy Efficiency Act, in place since 1988, has resulted in over $250 million in energy savings to Ontario's consumers. More products and more efficient products continue to be added.

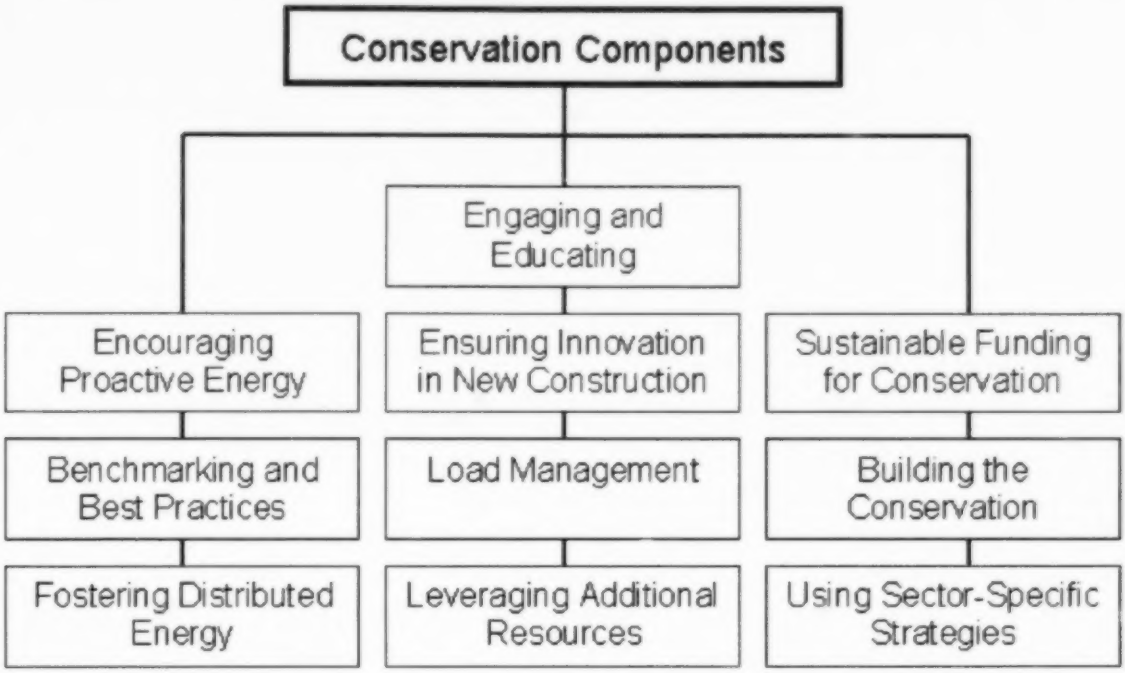
Ontario is one of only two jurisdictions in Canada to cite the international standard, ASHRAE 90.1, in its Building Code (The City of Vancouver Building By-law references ASHRAE 90.1, 2001). Ontario is the only jurisdiction in Canada to reference the Model National Energy Code for Buildings in its Building Code. Ongoing consultation is underway to improve the conservation aspects of these codes and ensure that some existing code elements are not inadvertently acting as barriers to conservation.

Through the Ontario Energy Board (OEB), the Ontario government has enabled local distribution companies (LDCs) to spend up to $163 million on conservation and has instructed the OEB to develop a long-term sustainable framework for funding local conservation programs. Local electric distribution companies are natural channels for delivering programs to end-use customers, just as the gas distribution companies do. They generally have trusting relationships with customers, who tend to seek and value their advice on energy use and costs.

The Ontario government has created a Conservation Bureau to spearhead the development of a conservation culture in the province. It has been charged with developing long-term conservation plans, providing input to the provincial demand/supply plan and reporting on the results achieved. It will work cooperatively with the LDCs, sharing best practices, establishing measurement and verification protocols and ensuring that conservation is cost effective relative to supply options.

The creation of the Conservation Bureau as part of the Ontario Power Authority does not remove the responsibility to provide province-wide leadership for conservation. Virtually every provincial ministry has a stake and a role in conservation. Many ministries are building owners, and/or are responsible for crown corporations or agencies, boards and commissions, which own or manage provincial and leased buildings and transportation fleets. Others dispense operating and capital funding to public institutions. Others are directly or indirectly responsible for regulations, finance, education and information, which influence homeowners, businesses and industry. The government proposes to vest this leadership role in legislation.

This document provides a framework for the development of Ontario's long-term Conservation Plan. It is based on the input provided to the Conservation Action Team during its consultations during 2004. During those consultations, ten fundamental components for action were identified and a wide range of supportive tactics were suggested. As such, this document provides illustrative tactics for each component that could be included in the long-term plan that is developed. The choice of the most appropriate set of elements, timing priorities and resourcing are the responsibility of the Chief Energy Conservation Officer.



Engaging And Educating Consumers

The transformation to a sustainable energy efficient economy, and the realization of the potential economic benefits to the province, depend upon establishing the necessary skills, knowledge, behaviours and attitudes throughout the population. Well-structured information and education can achieve remarkable and sustainable levels of conservation without significant capital expenditures. As such, educational institutions could play a defining role in forming and implementing the provincial strategy for conservation and renewable energy.

Illustrative Tactics

- Citizens of Ontario - Establishing a conservation culture in Ontario.
- Students and Teachers - Integrating conservation into school curricula; developing curricula to establish the skills, knowledge and behaviour of conservation and renewable energy; developing guidelines for relating curriculum to energy efficient design, operations and occupant behaviour in educational facilities.
- Colleges, universities, skills training - Increasing conservation related training in colleges, universities and apprenticeship programs to cover all facets of energy management for industry and buildings. Even buildings designed with conservation in mind do not achieve their potential savings unless they are operated with the same mindset.
- Communities - Engaging community organizations, non-governmental organizations and public interests groups in culture change, communication, education and implementation of conservation.
- Homeowners and businesses - Establishing accessible and understandable means of benchmarking energy use, planning and implementing conservation projects, accessing resources and technologies as well as tracking energy and financial savings with specific attention to low income consumers and small business.
- Industry - Pursuing strategies for job creation in the manufacture of products and the delivery of services related to conservation and renewable energy; accelerated development of new technologies. Increasing

conservation related training to industry.

Encouraging Energy Retrofits

Significant conservation potential in Ontario lies in renewal of buildings and industrial infrastructure. Capital investment in replacing old and inefficient plant and equipment, upgrading building structures and systems, and installing new technology, creates a more modern, healthy and productive environment, as well as improved conservation. Where appropriate, such capital investment can be funded through energy cost savings to repay principal and interest over a number of years.

Some organizations have undertaken comprehensive energy management projects and programs. Such initiatives have mostly been the result of individual leadership and a supportive corporate culture. These examples can provide useful insight into the factors needed to motivate widespread take-up of conservation and renewable energy, both in the public and in the private sector. And any strategy designed to support energy retrofits should be directed at implementing comprehensive solutions rather than individual technologies. Addressing all energy systems in a building at the same time achieves greater savings at less cost and with less administration and disruption.

Major building renovations create the opportunity for substantial conservation improvements, at far less cost than an energy-only retrofit. When physical plant, building systems and structural elements are being replaced, an integrated approach can significantly reduce heating and cooling loads, along with associated plant capacities and energy use, achieving greater conservation and lower life-cycle costs.

Illustrative Tactics

- Facilitating energy auditing and benchmarking of existing buildings (and homes) and providing access to resources to implement retrofits.
- Incorporating EnerGuide for Homes ratings in real estate profiles.
- Developing targeted programs for people on fixed/low incomes, with emphasis on switching from electric heat to other fuel sources.
- Establishing multi-year strategies for comprehensive retrofit and facility renewal for publicly funded institutions and encourage the private sector to do the same.
- Ensuring publicly funded institutions establish and maintain management reporting systems which cover energy use, costs and savings potential, implementation costs, and actual savings and encourage the private sector to do the same.
- Integrating conservation plans for public infrastructure renewal in both new construction and renovation.

Ensuring Innovation In New Construction

Taking action on new construction and renovation of private and public sector buildings can provide the lowest cost and most long-lasting reductions to energy demands and consumption.

Raising the standards for new buildings and major renovations is the most economical means of conserving energy in new buildings and avoids the lost opportunity cost associated with retrofitting improvements after the building is constructed. Raising the bar for new construction drives innovation among developers, builders and designers, which can lead to substantial and demonstrable performance improvements at little or no incremental cost. The

award-winning new Computer Sciences Building at York University is a dramatic example of a "green" building built at no cost premium. Some builders report that the cost of building homes to the R2000 standard is now approaching that of conventional designs.

Illustrative Tactics

- Supporting community projects and individual developers in obtaining demonstrably improved energy performance for new homes and developments.
- Adopting best practices from other jurisdictions.
- Determining energy trends in new housing and publicizing relative performance information.
- Employing design charrettes to transfer best practices.
- Utilizing home energy rating systems such as EnerGuide and Energy Star.
- Utilizing building rating systems such as Leadership in Energy and Environmental Design (LEED), Green Globes, or BOMA Canada's new Go Green methodology.
- Including conservation requirements in publicly funded new construction projects.

Sustainable Funding For Conservation

While substantial advances in conservation can be made through awareness, financial incentives and education, to achieve major progress in conservation and renewable energy requires significant capital investment. Timely access to capital is a serious barrier to action in all sectors. There exist, however, a number of innovative financing models that can be used. For example, energy performance contracting has established principles for financing projects to lower energy use and costs. Under this model, a contractor will design and install comprehensive conservation improvements, while a third-party lender finances the initial capital costs. The lender is then repaid through the energy savings that are achieved over a number of years. The building owner gains both the immediate benefit of the building improvements, and the long-term energy savings cash flow once the capital costs are repaid. (To date, this form of financing has been mainly limited to large buildings with high credit-rated owners.)

Illustrative Tactics:

- Encouraging financial institutions to offer higher mortgage limits for eligible home purchases and renovations based upon certifiably lower energy costs.
- Encouraging local distribution companies to finance eligible costs through utility bills, using third-party or their own capital.
- Establishing revolving funds and credit enhancement programs to pool the credit risk of individual customers.
- Providing the equivalent of capacity payments to purchase "least cost" conservation resources from large customers and/or aggregators.
- Creating a conservation trust fund that could leverage private sector funding and provide credit enhancements and guarantees to mitigate risk.
- Developing market mechanisms to connect accessible and affordable capital with energy consumers will enhance the effectiveness of a provincial strategy.

Benchmarking And Best Practices

For automobiles, we use "litres per 100 km" as a benchmark. In order to achieve significant behaviour change-and

significant investments in conservation-comparable benchmarking and rating systems are needed for our buildings, industries and homes. The rating systems that have been developed in other jurisdictions could be applied here.

The starting point and motivation for action to conserve energy comes from knowledge of the nature and scale of the potential to save money. Regular, understandable feedback on the impact of changes in energy performance would provide consumers with both the ability and the motivation to maintain optimal levels of conservation.. Widespread availability of useful and readily understandable energy performance information can be a powerful force in driving more conservation in Ontario.

Illustrative Tactics

- Taking advantage of advances in information technology and metering which make it possible for every homeowner, business and institution in the province to access this useful information about their energy use.
- Using web-based systems to allow comparison of energy use with comparable buildings and estimation of potential savings.
- Establishing systems that can analyze energy, and use data to account for weather and price differences.
- Identifying waste and untimely use of energy through interval metering so that action to be taken and conservation effectiveness to be verified.

Load Management

Smart metering is a critical enabling technology for conservation. Currently almost all residential and general service (small business) accounts, have analog meters that were invented just after Edison invented the light bulb. They must be read manually by a meter reader visiting the premise, unless the utility has convinced the customer to enter the data themselves on its website. Although most utilities bill every two months, meters are not always read that often. In between actual readings estimates are used, but when reconciling estimated and actual readings, disputes can arise and unexpected costs can result for consumers. Smart metering will include interval metering as well as a communications and information data management network to enable all customers to have ready access to their electricity use data as well as time differentiated prices, which will reward customers for not using electricity during peak hours of the day when demand is high.

Illustrative Tactics

- Coordinating actions to reduce peak summer and winter electrical demand, thereby improving reliability and reducing prices of power.
- Pursuing initiatives such as Enwave's Deep Lake Cooling system.
- Using ground-source heat pumps to reduce heating demand by 75%, and summer cooling peak loads by 30% or more, while improving overall system load factor.
- Encouraging additional conversions from electric to natural gas space heating where available to reduce peak loads in winter.
- Encouraging thermal storage in large commercial and institutional buildings as well as homes can lower peaks.
- Expanding the reach of metering and pricing signals beyond the current 4.5 million individually metered customers. Sub-metering of customers who are currently bulk metered offers these customers the full advantage of pricing signals and sub-metering.

Building The Conservation Industry

Energy conservation projects create substantial employment across the whole range of the labour market, from professional services to trades and labourers. The Pembina Institute for Appropriate Development estimates that 36.3 person-years of employment are created for each $1 million invested in energy retrofits. The Federation of Canadian Municipalities reports the number as 49-70 jobs per $1 million.

Capital investment in renewable energy in Ontario over the next decade is forecast to be up to $5 billion, based upon the final report of the renewable energy task team. As renewable energy developments are even more labour intensive than conventional energy projects, it can be anticipated that this investment will also create incremental employment in the province. In addition, many products and services required for conservation or renewable energy are or can be produced in Ontario. A strong, accessible and sustainable provincial market for conservation and renewable energy will provide fertile ground for innovation, commercialization and international competitiveness.

Integrating an aggressive approach to product and building standards for conservation with programs designed to stimulate market transformation in the adoption of new technologies will have significant benefits. Minimum efficiency levels for products, in turn, can ensure that the least efficient equipment is removed from the market. Market transformation programs such as Energy Star labeling and new product development raise the energy efficiency bar.

The Ministry of Energy will continue to regulate products under the Energy Efficiency Act and the Ministry of Municipal Affairs and Housing will continue to regulate buildings under the Ontario Building Code. However, the Conservation Bureau will have the opportunity to develop province-wide programs for market transformation and the introduction of products and buildings that go beyond standards. These programs will in turn enable higher standards to be implemented sooner.

Illustrative Tactics

- Promoting integrated building design and leveraging programs such as the Commercial Buildings Incentive Program.
- Supporting innovative projects such as those proposed by the "Net Zero Energy Homes Coalition".
- Ensuring inefficient, older appliances are taken out of the market, their materials recycled and any toxic components managed.
- Linking with U.S. "market transformation" programs to accelerate improved equipment efficiencies across North America.
- Ensuring government and other public sector procurement policies require high efficiency equipment and conservation considerations.
- Creating partnerships to stimulate innovation.

Encouraging Distributed Energy

Ontario has the potential to conserve energy by making extensive use of distributed energy (DE), which includes the following:
n High efficiency cogeneration (combined heat and power): system efficiencies can be as high as 80 - 90% compared with the centralized supply efficiency of 25 to 30%;

n On-site renewable energy systems; including wind, solar, and ground source heat pumps;
n Energy-recycling systems, including energy from waste, waste heat and pressure drops to generate electricity on site;
n District energy systems such as Markham District Energy Corporation, or Enwave Energy Corporation; and
n Fuel cells.

Stand-alone distributed energy, local energy networks and use of decentralized technologies can all complement each other. However, there are longstanding regulatory, attitudinal and institutional barriers that must be addressed in order to realize the significant distributed energy potential in many industrial, institutional, multi-residential and agricultural applications.

Illustrative Tactics

- Giving all electricity generators fair and non-discriminatory access to transmission and distribution grids.
- Ensuring that transmission and distribution providers encourage DE interconnections.
- Reflecting any benefits that generators provide to the system in system pricing (i.e., voltage and frequency support, grid reliability, reduction in T&D losses, reduce requirements for spinning reserve).
- Encouraging cost benefit analysis, which can enable DE to be developed in areas where its local benefits outweigh the costs of constructing or upgrading new transmission and distribution facilities.

Leveraging Additional Resources

Neither the Government of Ontario, nor the Conservation Bureau can create a conservation culture alone. A wide range potential partners and resources that are already playing a major conservation role, particularly given that energy conservation and climate change mitigation are closely aligned. The federal government is active in such programs and some municipal and regional governments have developed comprehensive projects to improve conservation in their municipal operations. In some communities, non-governmental agencies have taken the lead, implementing community-wide programs aimed at improving the conservation in existing and new buildings, and at developing integrated, fuel efficient transportation schemes.

In the industrial sector, for example, The Canadian Industry Program for Energy Conservation (CIPEC) represents 294 companies, through 24 sector task forces. Ontario members of CIPEC have already expressed an interest in working in concert with the Conservation Bureau.

Illustrative Tactics

- Leveraging federal government energy related Climate Change Programs such as Energy Innovators, EnerGuide for Housing, and the Canadian Building Incentive Program.
- Leveraging municipal/community programs and the Federation of Canadian Municipalities funding, such as the Better Buildings Partnership, Green Communities, and Sustainable Peterborough.
- Working with non-government organizations to encourage grass roots involvement such as Conservation Council of Ontario, Eco-Perth, or Low Income Energy Network.
- Working with financing partners such as financial institutions, pension funds, Energy Service Companies, Service Providers, and Associations.
- Working with educational and consumer groups, including Environmental Education Ontario, Eco Schools, the Consumers Council of Canada, the Canadian Institute for Energy Training, Seneca College, and

Georgian College.

- Working with key stakeholders, including developers, builders, architects, engineers, building owners, managers and tenants, and their professional and trade associations. These groups include: the Urban Development Institute; Sustainable Buildings Canada; Canadian Green Buildings Council; Ontario Association of Architects; Royal Architecture Institute of Canada; Ontario Homebuilders; Greater Toronto Home Builders; and EnerQuality Corporation.
- Working with Associations representing key customer groups, including the Ontario Mining Association, Canadian Forest Products Industries, The Retail Council of Canada and Building Owners and Managers Association.

Using Sector Specific Engagement Strategies

The preceding nine elements of Ontario's Conservation Framework apply to all types of energy consumers. However, to engage all consumers will require an approach that is tailored to the specific needs of each sector in the market place. Like customer segmentation in marketing, effective implementation of a conservation strategy relies on understanding consumer concerns and decision-making processes and then developing targeted programs to elicit action.

The usual segmentation for energy analysis is by customer type (i.e., commercial, institutional, industrial and residential), by energy use (such as in homes, buildings and/or industrial processes), or by equipment type (i.e. lighting, motors, and appliances). To ensure that a conservation culture becomes ubiquitous in Ontario, each of the nine elements must be applied in each sector in ways that make sense to the decision-makers in that sector. Below is only a partial segmentation for the conservation culture.

Industrial

- Mining
- Forest Products
- Pulp and Paper
- Steel/Aluminum
- Chemicals/Refining
- Plastics
- Electric
- Rubber
- Food & Beverage
- General Manufacturing
- Textiles
- Transportation

Residential

- Single Family Homes
- Townhomes
- Condominiums
- Multi-Unit Residential Rental Units
- Social Housing

Commercial

- Offices
- Retail
- Warehouses
- Accommodation (Hotels/Motels)
- Restaurants
- Leisure and Recreation

Institutional

- Federal Buildings
- Provincial Buildings
- Municipal Buildings
- Schools, Colleges, Universities
- Hospitals
- Long-Term Care Facilities
- Places of Worship

Benefits Of Conservation

Conservation has significant benefits that include:

1. Improved air quality
2. Mitigation of climate change
3. Power system reliability
4. Public infrastructure renewal
5. Reducing water use and costs
6. Reducing operating costs for public institutions
7. Sustaining Ontario's competitiveness and creating jobs

Air Quality

Conservation lowers the environmental footprint of the electric industry, particularly fossil fuel generation, which is one of the most significant sources of pollution in modern society. Load management and load response programs lessen the need for new power plants and transmission lines, while efficiency measures lower total fuel consumption and the related costs of air pollution, fuel extraction, and waste disposal.

Mitigation Of Climate Change

Reducing energy use in buildings and industry across Ontario would avoid 19 megatonnes per/year of greenhouse gas emissions. Extending energy management action to the province's transportation sector could add a further estimated 4 megatonnes /year. Together, these reductions would amount to more than 10% of Ontario's 2000 emissions (190 MT). Since Ontario is below the average emissions intensity for Canada, such a reduction would be very significant nationally, while contributing positively to the provincial economy.

Power System Reliability

Conservation is the most effective, timely, economic and beneficial means of restoring and maintaining balance between electricity supply and demand in the province. Conservation will also reduce imports of high-priced power from neighbouring jurisdictions.

Public Infrastructure Renewal

The greatest potential for conservation in Ontario lies in renewal of building infrastructure. Capital investment in replacing old and inefficient plant and equipment, upgrading building structures and systems, and installing new technology, creates a more modern, healthy and productive built environment, as well as improved conservation. Where appropriate, such capital investment can be funded through energy performance contracting, where energy cost savings are used to repay principal and interest over a number of years.

Reducing Water Use And Costs

Ontarians spend $2 billion/year on water and sewage charges. Programs for reducing energy demand can also address end-use water consumption, lowering demand on water supply infrastructure and related energy costs.

Reducing Operating Costs For Public Institutions

Schools, hospitals, colleges, universities and municipalities together represent more than 5% of the energy use of the province as a whole. Energy represents one of their largest non-core expenditures. A few individual organizations are taking action on conservation, but there is little coordination. Considerable potential remains for cost-effective retrofits. Construction of new buildings and major renovations and expansions of existing buildings are proceeding without consistent energy performance standards. NR Can's Commercial Building Incentive Program offers funding to support design of more energy efficient buildings. It is neither effective nor economical for individual public organizations to tackle these issues independently.

Sustaining Ontario's Competitiveness And Creating Jobs

Conservation can act like a tax reduction, putting more money in the hands of individual taxpayers. It also reduces operating costs of business, government and public institutions, and makes the province more competitive.

Conservation is the most effective means of lowering energy bills and maintaining reliability of supply in Ontario, which in turn is an important element in the province's ability to attract and retain industries and the employment they create.

Benefits Of Distributed Energy

Small Project Size Creates Flexibility: Like run-of-the-river hydroelectric, the smaller size of distributed energy projects means that activity in this sector does not have to wait for policy on major supply.

Reduced Costs and Environmental Benefits: Ending the bias toward central generation may upset vested interests and require political effort, but the rewards are substantial: lower prices than under a centralized

approach, reduced pollution, reduced greenhouse gas emissions and a less vulnerable power system. The current estimate for required capital investment in the North American electricity industry over the next 20 years using the traditional centralized approach is approaching $ 1 trillion dollars ($US). According to the World Alliance for Decentralized Energy, a decentralized approach is $400 billion less and will cut retail costs by 40%, fossil fuel demand by 47%, and carbon emissions by 49%.

Distributed Energy Reduces Impact of Catastrophic Blackouts and Reduce Costs of Avoidance: While most of New York City was in the dark during the August Blackout and three airports, including Pearson, were closed because their emergency generation systems were not equipped for a prolonged blackout, hospitals, businesses, offices and apartment buildings capable of generating their own electricity had power throughout the Blackout. The immediate response to the Blackout was the call for billions of dollars to be invested in transmission and distribution (T&D). Clearly the past decade has resulted in some deterioration of the grid both in Ontario and the US. However, DE can reduce the stresses on the T&D. DE can also be targeted at locations, which exhibit high T&D constraints such as Toronto.

Potential for Multiple Wins: Distributed Energy has additional attractive characteristics.

Issue	Advantage
Electricity Supply	Small scale, distributed energy projects improve reliability and diversity; geographic location can reduce transmission and distribution congestion; a wide variety of capital and contract arrangements are possible.
Air Quality	Higher efficiency replacement of coal plants
Energy from Waste	New technologies represent opportunities to change waste into energy including agricultural waste and sewage treatment.
Mitigation of Energy Price Increases and Volatility; Low Income Protection	Potential hosts for cogeneration include farms, densely populated multi-residential units including social and non-profit housing ; linkage to rent control issue; water treatment plants, wastewater treatment plants and other public facilities. Access to dual fuel technologies increase flexibility to address price volatility; freeing up provincial funding for education and health care.
Public Infrastructure	High efficiency energy supply solutions can offset renewal costs; can satisfy green procurement requirements
Ground Water Pollution	Relates to using Biomass for energy on farms.
Water Quality	Water treatment and wastewater treatment infrastructure improvements
Rural and Remote Areas	Integrated power-supply systems for rural and remote communities.

Benefits Of Smart Metering

Customer Benefits

- Informed and empowered consumers
- Less volatile prices, lower bills (1)
- Immediate feedback
- No estimated bills
- Wider variety of payment options and cycles
- Increased choice

Electrical System Benefits

Asset Management

- Accurate line loss map and condition monitoring
- Reduced line losses
- Positive confirmation of a metering point
- Quantification/Reduction of consumption on closed accounts, e.g. vacant premises
- Meter diagnostic flag

Billing and Customer Care

- Reduced complaints/accounts queries/estimated reads
- Reduced cost of re-worked bills(1)
- Incremental reliability payments - selective load retention
- Customer selected billing dates and frequency
- Eliminate false claims from power surges, damaged goods and stocks
- Outage notification

Collections

- Reduced costs and reduced risk of bad debt
- Cash flow benefit of monthly billing
- Reduced invoice to pay timing

(1) Pilot Program on Interval Meters in the United States showed that 10 to 20% electricity savings were possible when the right price signals were available to customers.

Conservation and Demand Response

- Defer investment in peaking plant by shedding peak loads
- Overall dampening of peak pricing

Field Work Management

- Avoided costs of disconnect/reconnect
- Pinpoint line faults, reduce search costs
- Reduce turnaround time for repairs
- Avoid unnecessary service calls (false power outage claims)

Load Forecasting

- Bottom-up, more granular load forecast process
- Geographically based forecasts of network loads

Metering

- Leverage planned maintenance and refit schedules
- Avoid standard metering reading costs including interfaces
- Avoid one-off trips for special reads (final reads meter checks, etc.)
- Trigger Metering for peak demand management and real time network management
- Tamper detection
- Avoid meter reader hazards (dogs)
- Unusual loads (Grow Operations)

Outage and Restoration

- Avoided costs of mail-out for planned outages
- Positive confirmation of unplanned outage
- Communicate outage and time to restoration
- Reduce call centre traffic

Safety

- Isolation of embedded generation
- Line loading
- Fire risk

Rates and Regulation

- Avoids incremental cost for load research for cost of service studies
- Change rates without changing meters
- Performance monitoring for service quality and conservation

Other Utilities

- Synergies with natural gas and water

System Wide Benefits of Smart Metering

Barriers To Conservation

There are a number of key market barriers that impede the timely, economic adoption of measures to conserve energy. These market barriers are well described in conservation literature. The market barriers can be classified into the following five major categories:

Inadequate Financing - The lack of a mature market for conservation financing has resulted in limited availability and high financing cost, as most lenders are not familiar with the risks and benefits of conservation projects.

Emphasis on Lowest First Cost - Conservation is hindered because many consumers, governments, institutions and businesses base purchase decisions on the initial capital cost of a product without considering the life-cycle operating cost savings.

High Transaction Costs - Adoption of conservation products and practices involves high transaction costs such as learning about efficiency opportunities, difficulty in integrating into complex expansion/renovation projects and the effort needed to coordinate the many diverse elements of a conservation project.

Lack of Information/Limited Conservation Infrastructure - Many consumers and businesses are unaware of the opportunities that exist for conserving energy. They lack information about the anticipated costs and benefits of conservation improvements. They are sceptical about the reliability of claimed savings and/or fear performance degradation from switching to higher efficiency products.

Regulatory and Governmental Policies - Examples of this include lack of policies that reward utilities for

encouraging conservation, unfair treatment under the Income Tax Act, and policies that create an incentive for utilities to increase revenues by increasing quantities of electricity generated, transmitted, distributed and sold.

Geographical Diversity - Ontario is a large province with many regions, where distance or population densities make conservation program delivery expensive. Yet, these regions are frequently where it is most needed. For example, in northern Ontario several factors combined make conservation critically important: the older housing stock is inefficient, fuel prices are higher and incomes are lower. The challenge may be on the delivery side, where economies of scale for program delivery may act as a barrier to cost-effective implementation.

Beyond Conservation

Using Energy Management To Create A New Sustainable Competitive Advantage For Ontario.

In the past, low electricity prices were a significant driver of economic development in Ontario. However, these low prices also created a culture of waste and reduced the importance of conservation and energy management in our industries, our buildings, our institutions and our homes.

As Ontario moves toward paying the true cost of electricity, the natural competitive advantage of cheap, plentiful electricity disappears. But as electricity rates increase, it is possible for electricity bills to go down and productivity to improve.

n In industry, energy management that is linked to operational improvements, better maintenance and process control optimization can deliver more savings than higher efficiency equipment.
n In buildings and institutions, better energy management improves occupant comfort, safety and security, as well as reduces building operating costs, thereby freeing up resources that can be redirected to service level improvements.
n In homes, energy management can improve comfort, convenience and health, while increasing prosperity with less after tax income being used for necessities.

Simply having 4.5 million Ontario households independently poised to switch on dishwashers, washing machines and other appliances at 3 a.m. will not make for true DSM. Instead, a coordinated, cooperative approach is needed that can track ever-changing peaks in demand, incorporate responses from central entities and harness the stand-by generation capacity in each of Ontario's municipalities.

Leveraging the existing fiber optic networks of Hydro One and other electric utility telecoms with "last mile" solutions such as fixed wireless and power line carrier can make broadband connectivity ubiquitous in Ontario. This infrastructure would enable real time technologies such as supervisory control and data acquisition systems that would allow the entire electricity supply and demand chain manage energy use in real time.

Combined with a transformation to distributed energy systems, where most public institutions, farms and many industries could be "net exporters" of electricity to the grid, communities could become virtually self sufficient with respect to electricity with the transmission grid major functions being reliability and balancing.

home :: top of page

about the ministry :: media centre :: conservation :: renewable energy
electricity :: oil and gas :: news releases :: archives

central site : feedback : search : sitemap : francais

Ontario

this site is maintained by the government of Ontario, Canada

Contact the Ministry of Energy

© 2005 Queen's Printer for Ontario

This information is provided as a public service, but we cannot guarantee that the information is current or accurate.
Readers should verify the information before acting on it.

Printed from the Ministry of Energy website:

www.energy.gov.on.ca/index.cfm?fuseaction=conservation.actionteam_report2005

© 2005 Queen's Printer for Ontario

This information is provided as a public service, but we cannot guarantee that the information is current or accurate.
Readers should verify the information before acting on it.

- Home:
- About the Ministry
- What's New
- Agencies + Corporations
- Contact Us

- Media Centre:

- News Releases
- Speeches
- Audio + Video
- Media Contacts

- Conservation:
- Energy Saving Tips
- Heating + Cooling
- Electricity Calculator

- Renewable Energy:
- Wind
- Solar
- Hydroelectric
- Hydrogen
- Biomass

- Electricity:
- Legislation
- Reports
- FAQs

- Oil and Gas:
- Gasoline Report
- Fuel Prices
- Natural Gas
- FAQs

- Archives:
- News Releases
- Reports